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The Tsetse Fly Problem and its Control in South Africa

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INTRODUCTION

So far as the Union of South Africa is concerned tsetse flies may be considered to constitute but a minor problem because they are confined to parts of Zululand only. The area involved, however, comprises some 7,000 square miles of extremely valuable country particularly suited to the raising of cattle.

For Africa as a whole, particularly equatorial Africa, the 20-odd described species of tsetse flies constitute by far the major problem with which this continent has to contend. This may sound a rather sweeping statement to make in the face of such a disease as malaria, but it must be borne in mind that in the presence of tsetse flies it is not possible for a large community of human beings to exist. In the first place man may be directly affected by the fatal disease, sleeping sickness, as a result of which human beings shun vast tracts of tropical Africa. Secondly, where this human infection does not exist in the tsetse fly-infested areas, animal trypanosomiasis or, as we know it, "nagana," makes it impossible to keep stock, and man and his domesticated animals are inseparable.

Tsetse flies are highly specialized insects which live exclusively on blood, in most cases that of warm-blooded animals. Their life histories are exceptional in the insect world and their habits are such as to make their control a problem which has taxed human ingenuity to its limit with, to date, comparatively little to show for the effort expended.

From time immemorial communities of these flies have existed in Africa, the continent to which they are confined, with the exception of one species which is alleged to occur to a very limited extent in the southern tip of Arabia, undisturbed in most instances by the advent of European civilization. The distribution of the different species of tsetse flies is dependent upon environmental requirements that are special to each and, although they have one requirement common to all, namely, an assured regular food supply in the form of blood of the host animals, there is considerable variation in respect of their other requirements. Thus at one end of the scale there is the dreaded *Glossina palpalis*, notorious for the role it plays in the transmission of human sleeping sickness: it requires a high degree of shade and humidity and for this reason is confined to the banks of lakes and streams. At the other end are species such as *Glossina morsitans*, which is a typical savannah type requiring more open park land and is found frequently a long way from any open water. Between these limits each other species has its own particular requirements confining it to certain special botanical associations.

THE LIFE HISTORY OF THE TSETSE FLY

The life history of the genus *Glossina* consists of the formation of a single egg at a time, which hatches within the body of the female. The egg-shell is extruded and the white grub-like larva, provided with a dark posterior end on which the spiracles are situated, remains within the uterus of the female, with its oral aperture attached to a minute teat leading from a special milk gland, until almost ready to pupate. When mature it is deposited on the ground and immediately burrows its way for a short distance under the surface. Here it metamorphoses within about an hour to form a characteristic dark brown barrel-shaped pupa having two distinct knob-like projections at one end. From this pupa the fully formed adult fly emerges. There are variations within the genera in the duration of the different stages and as to the site for deposition of the larvae.

THE FOOD HABITS OF THE TSETSE FLY

The food habits of the different species also vary. *G. palpalis* will frequently feed upon cold-blooded animals such as crocodiles and monitor lizards (iguanas), although in common with other species like *G. morsitans* and *G. tachinoides*, it may be looked upon as largely homophilic. *G. pallidipes* and *G. brevipalpis*, on the other hand, do not appear to be so readily attracted to human beings and may be regarded as more zoophilic in their food preferences. These differences in habits may possibly account for the relative importance of *G. palpalis*, *G. tachinoides* and *G. morsitans* as transmitters of human sleeping sickness. *G. pallidipes* is not normally associated with the transmission of human sleeping sickness, but recent evidence obtained in Uganda indicates that it can do so. This appears to support the contention that all species of tsetse flies are capable of transmitting the trypanosomes responsible for either animal or human trypansomiasis, but their importance in this respect depends upon their food habits.

All species of tsetse flies are basically dependent upon wild antelopes for food, but the different species show individual preferences. *G. morsitans* appears to feed principally upon the large game species such as buffalo, koodoo, etc., and apparently cannot maintain itself upon the smaller species only. On the other hand, *G. pallidipes* is apparently able to adapt itself to the smaller species such as the warthog, bushbuck, etc., without access to the larger species.

Methods of Controlling the Tsetse Fly

GENERAL METHODS

The very intensive studies which have been made upon the life histories and habits of the different species of *Glossina* have indicated that great importance must be attached to seemingly insignificant differences in habits such as those detailed above and in certain instances control measures based upon utilization of factors related to such habits have yielded spectacular success.

In general the methods of control which can be applied successfully to this genus may be summarized under the following heads:—

1. Those designed to affect adversely the environmental requirements of the fly. These consist of the elimination of shade, particularly by the removal of certain types of thicket bush, and have yielded most success with *G. palpalis*—a species confined to the banks of lakes and rivers by virtue of its dependence upon high degrees of shade and humidity.

With other species which are not confined to such narrow limits the application of the method is more difficult as much larger areas have to be cleared and clearing requires the elimination of more species of plants. In these cases maintenance of the clearings is very costly.

2. Those designed to eliminate or reduce the food supply of the fly to a level at which it can no longer maintain itself—the destruction or removal of game animals. These measures have been very successfully applied in Southern Rhodesia, where it is claimed that approximately 6,000 square miles of country have been freed of *G. morsitans*.

With certain species this method has not been so successful, presumably because the flies concerned can adapt themselves to feeding and maintaining themselves upon smaller animal species that evade the measures used.

3. The direct attack upon the fly itself without disturbing either its environmental or food requirements. Apart from the question of biological control by means of hyperparasites or predators two methods appear to be possible, the use of a trap capable of catching the fly in sufficient numbers to lead ultimately to its complete extinction, and the application of an insecticide in a manner capable of achieving eradication.

THE TSETSE FLY IN SOUTH AFRICA

Before going into this question of the application of insecticides for tsetse fly control a brief description of the problems presented by tsetse flies in the Union should prove of interest.

There appear to be four areas in Zululand which may be regarded as the primary foci of tsetse flies and from which occasional extensions into the surrounding country may occur. From south to north these areas consist of the Umfolozi Game

Reserve (*G. pallidipes*); some 30 miles to the north the Hluhluwe Game Reserve (*G. pallidipes* together with *G. brevipalpis*); about 40 miles further north is the Mkuzi Game Reserve (*G. pallidipes* and in addition a small species, *G. austeni*); adjacent to the Mozambique border is the Nduma Game Reserve (*G. brevipalpis*).

According to the writings of some of the early colonists, notably the Voortrekker, Louis Trichardt, a fourth species of tsetse fly, probably *G. morsitans*, occurred in the Transvaal prior to 1900. It extended along the Limpopo river and its tributaries eastwards and well down into the eastern low veld areas of the Transvaal. At about the time of the rinderpest epizootic in 1896 it disappeared completely and has never recurred since. There is evidence to show, however, that it was disappearing from the western limits of the area even prior to the advent of the rinderpest.

Differences of opinion exist as to the factors responsible for its disappearance from the Transvaal, but in view of the results achieved in recent years in Southern Rhodesia in freeing large tracts of country from the same species by partial game elimination, it seems obvious that it was due to the depletion of host animals as a result probably of hunting, and later of rinderpest, which decimated many of the game species, the larger ones particularly. *G. morsitans* is not now a problem in the Union, but it is present to the north in Portuguese territory, and has shown a tendency to spread during the last ten to 15 years, and a re-invasion might occur.

In Zululand the relative importance of the *Glossina* species is determined by the climatic and vegetational requirements of the three species present. Thus *G. pallidipes*, which is by far the most important, may be called the savannah species which infests typical savannah bush veld and, by virtue of the extent of the type of bush capable of supporting it, occurs over very considerable areas. *G. brevipalpis* may be looked upon as a forest species requiring dense shade as is afforded by the forest bush of the Hluhluwe Game Reserve and the riverine forests along the Pongola river near the Portuguese border. This species is, therefore, very much more confined in its distribution and will never constitute the problem which is presented by *G. pallidipes*. In the case of *G. austeni*, which we may call the riverine and savannah thicket species, more information is required in order that its exact distribution may be plotted, but up to the present it appears to be confined largely to the Mkuzi river and the country adjacent to it.

The conditions governing the continued existence of a community of tsetse flies thus consist of a vegetational association and climate suited to the requirements of the particular species, together with a permanent food supply in the form of host animals which, by virtue of their habits and close association with the fly, assure the latter of a blood meal at intervals of, at the most, three days. This delicately balanced association between the fly and its food supply is one which could presumably exist only under undisturbed natural conditions; should any factor or factors intervene which would upset the normal habits of the game, a disturbance in this balance could occur, as a result of which the fly would be unable to obtain its meal of blood within the three-day period and very heavy mortality, if not extinction of the species, would follow. Such a disturbance in the fly-host balance was successfully applied in Southern Rhodesia in the case of *G. morsitans*, with the result that the species became extinct over very large tracts of country as a consequence of starvation.

Up to the present the method has not been successful in the case of *G. pallidipes*, probably because this fly is (*a*) provided with senses enabling it to locate its food more easily, (*b*) adapted to feeding upon the smaller species of game such as warthog, bushpig, bushbuck, etc., which are associated with dense thicket and difficult to eliminate, or (*c*) capable of ranging over a relatively larger area actively searching for food.

In any campaign designed to eradicate *G. pallidipes* by interference with its food requirements apparently nothing short of total extermination of the host animals would be successful. In the Union we have been committed to a policy whereby it has been necessary to retain certain species of indigenous animals, such as the white rhinoceros, in fly-infested areas and our efforts have perforce been confined largely to the creation of game-free belts, with the object of preventing the spread of tsetse flies from their habitual haunts. This policy has greatly complicated the work of control and frequently confused the picture of the fly-host association because, on account of their wandering habits, it has not been possible to confine the animals to particular localities. In view of such a declared policy of game preservation the obvious alternative has been some direct method of attack upon the fly itself in its natural surroundings.

The Harris "Fly" Trap

The Harris Tsetse "Fly" Trap has been given very exhaustive trials in Zululand over many years. By its use a very useful index of the presence of "fly" can be obtained, but it has not been possible to control or even to bring about a reduction in the numbers of *G. pallidipes* and *G. brevipalpis*.

The Spraying of DDT from Aircraft

Various reports, mostly in photostat form, were received from the Union's Scientific Mission to America during the war. These included the apparently successful application, particularly in the Pacific theatre, of DDT from aircraft for the control of malaria and fly-borne dysentery amongst troops. They also contained information on the use of aircraft for its application in the Mediterranean and other areas. This led, early in 1945, to consideration of the possibility of utilizing the method for the eradication or control of tsetse flies in the extensive bushed areas of Zululand.

In the case of the malaria vectors the insecticide could be applied from aircraft to destroy effectively large numbers of the adult insects lurking in sylvatic surroundings and also, if well distributed over breeding areas, to control the immature stages as well. It was considered that DDT might be applied in this way from aircraft in certain bushed areas in Zululand during the maximum period of leaf drop, when the cover for the tsetse fly would be least. On account of their life history, tsetse flies, however, could be brought into contact with DDT only in the adult stage as the larval and pupal stages would not be affected. It would, therefore, be necessary to make repeated applications at intervals within the gestation period of the female fly, to prevent further depositions of larvae, and to spread them over a period sufficient to allow of the hatching of all pupae present in the ground at the time of the first application. By this means, and provided that 100 per cent. mortality of adult flies resulted at each application, the hope was entertained that complete eradication could be achieved within the experimental area or that the number of flies could be so reduced as to make it possible by further applications at the end of the period to achieve success.

From preliminary experiments at the Field Nagana Research Station in the Umfolozi Game Reserve in Zululand satisfactory evidence was obtained of a high degree of susceptibility of *G. pallidipes* (the species involved) to DDT, and it was found that tall dry grass and bush treated with both emulsions and solutions of DDT showed residual effects over considerable periods.

It was deemed advisable that the area chosen for the trial of the efficiency of DDT should be one representing, as far as was possible, an untouched natural locality containing a high density of fly together with an ample number of host animals in the form of game antelopes. At the same time the area should be isolated in order to obviate the rapid infiltration of new flies from the surroundings. In order to be in a position to assess the value of the DDT applications at the conclusion of the experiment it was necessary to choose an area where fairly accurate observations regarding relative fly density had been conducted for a considerable period prior to the commencement of the experiment. The question of a control area which would be left untouched and which would serve as a basis of comparison with the treated area was considered, but in view of the topography of the country and the dangers of fly infiltrating into the experimental area if such a control area was left in the immediate vicinity, it was decided to dispense with such a control and compare results with conditions existing in more distant fly-infested areas even though, on account of climatic conditions, these areas were not strictly analogous.

The experimental area decided upon was the Mkuzi Game Reserve covering approximately 30 to 35 square miles, lying to the east of the Ubombo Range of mountains and bounded on the north by the Mkuzi river. To the east and south there is comparatively open country, with the exception of small thicket areas which it was the intention to include in the experiment. An accurate record of the fly position existed as revealed by Harris Tsetse "Fly" Trap records over many years. The only species of tsetse flies within the area consisted of *G. pallidipes*, with rare isolated records of *G. austeni*, taken in the immediate vicinity of the Mkuzi river, the banks of which are lined by magnificent wild fig trees amongst which in parts there are dense shrub thickets and extensive patches of reeds.

At the time the Union Defence Force was the only body from which aircraft could be obtained and these consisted of military types with the exception of a few heavy commercial machines which had been taken over from Union Airways. The type of aircraft selected for the initial attempt was a J.U. 52 which was fitted with two fuselage tanks of a combined capacity of 400 gallons.

The Technique of Spraying the DDT Mixture

It was considered that it was necessary to employ a finely atomized spray which would adequately penetrate thickets and make contact with the adult flies. The actual spray delivery apparatus used was adapted from information obtained from American sources and consisted of a venturi slung under the fuselage. The spray fluid was fed by gravity through radially arranged holes at the throat of the apparatus so that jets of fluid impinged on to a central point where the airstream, accelerated by the anterior cone of the venturi, came into contact with it, breaking it up into fine droplets. It was found, however, that a certain amount of reconsolidation of atomized spray took place against the sides of the posterior cone of the venturi and to overcome this difficulty, which was considered a disadvantage, a second metal cone was arranged over the posterior orifice of the venturi in such a way that the impinging columns of air would cut through the partially atomized spray and complete the process of atomization.

Fig. 1 shows the spray delivery apparatus.

In the course of a series of test runs conducted with this apparatus and using a variety of spray fluids it was found that it was necessary to incorporate an oil soluble dye into certain of them in order to observe the actual distribution of the spray on test cards arranged on the ground. Flying at a height of 50 to 60 feet, crosswind at wind speeds of between six to ten miles per hour, gave what was considered to be an effective swathe-width of 70 yards, at the same time allowing a safe margin for overlap of swathes.

The method of testing distribution of spray, and the actual results obtained on test cards, are illustrated in Figs. 2 and 3.

The initial attempt using J.U. 52 aircraft fitted as described above was undertaken in July, 1945. The spray used consisted of an oil in water emulsion containing 5 per cent. of the para para isomer of DDT dissolved in toluene and containing 10 per cent. of a heavy mineral oil, saponified pine resin being used as the emulsifying agent. Delivery of spray was adjusted to 25 gallons per minute which, at the speed of the aircraft of 120 miles per hour, gave a coverage of one gallon of spray fluid per acre or ·5 lb. p.p. DDT per acre.

Great difficulty was experienced during this initial attempt in the actual application of the spray, in that it was not found possible to land the aircraft on the landing strip which had been prepared in the Mkuzi Reserve for this purpose, and use had to be made of an aerodrome over 50 miles away from the scene of operations. The result was that no adequate contact existed between the ground party and the aircraft personnel, and coverage of the area had to be left to the judgment of the pilot. This arrangement proved most unsatisfactory.

Valuable information was gained, however, which pointed the way to various refinements which were incorporated in the later spraying ventures. In the first place it was found that the aircraft used was not well suited for the purpose and, apart from being cumbersome and not easily manoeuvrable at this low altitude, the engines were inclined to overheat. Secondly, the emulsion used although well atomized and giving a fairly satisfactory penetration of thickets, was inclined to be deposited upon foliage in the form of discrete droplets which showed no tendency to spread upon leaves. It was shown, too, that the saponified resin and some unsaponified resin was inclined to harden, thus forming a protective coating and masking the effect of the DDT, so that the residual effect appeared to be adversely affected.

In view of the practical difficulties encountered it was decided to cease operations at this stage and, using the experience gained, to re-organize the entire experiment, utilizing a lighter type of aircraft and substituting an oil solution type of spray for the emulsion.

During the second series of spray tests Avro Anson twin-engined aircraft were employed which were fitted with fuselage tanks of 200-gallon capacity. The same type of spraying apparatus was used, but in this case a 5 per cent. solution of DDT (pp. isomer) in furnace oil and paraffin was substituted for the emulsion. Seven aircraft were used and landed on the specially prepared airstrip in the Mkuzi Reserve which served as base for the operation.

It had been decided prior to the commencement of the work that the experimental area would be sprayed three times, spaced over a period of five weeks. Two weeks would be allowed to elapse between the first and second applications and three weeks between the second and third. This procedure was based upon the assumption that the first two applications would cover the normal gestation period of the flies, but that by the end of the second application a fair amount of DDT would have been deposited over the area, namely, 1 lb. per acre, which should exert a residual effect permitting of slight extension in the time necessary for the third application. By the end of the third application sufficient amounts of the insecticide would have been deposited to ensure a residual effect of at least an additional week, so that a period of at least six weeks would elapse during which all adult flies emerging from pupae in the ground would have been destroyed either by direct contact with DDT during the actual spraying operations or by contact with treated surfaces.

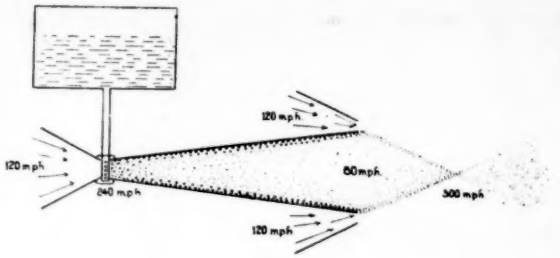

Fig. 1.

Rectangular container represents fuselage tanks of 200 gallons capacity, the contents of which are fed by gravity into the throat of the venturi.

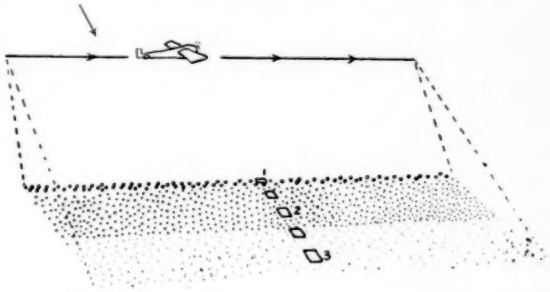

Fig. 2.

Arrow indicates wind direction.

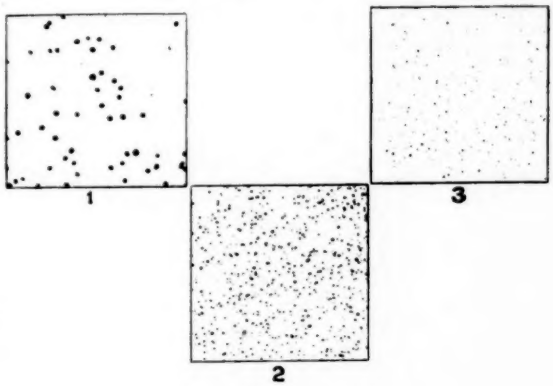

Fig. 3.

Spray droplet distribution on test cards arranged as shown in Fig. 1.

The Spraying Experiment

Spraying operations were commenced on November 30th, 1945, considerable difficulty being experienced to start with in arriving at a method by means of which the aircraft could be made to fly accurate parallel courses at intervals of 70 yards. Flying by means of instruments was soon proved to be too inaccurate to be relied upon, even though the starting points of the runs six to eight miles in length were marked by means of flags attached to tall masts. A procedure was evolved, however, whereby the spraying aircraft commenced its run over a flag, the course being set upon a smoke generator at the end of the run. Having made its turn the aircraft then sprayed in the reverse direction, com-

mencing the run over a flag and ending over a smoke generator. Occasionally it was necessary on account of the topography of the country to use a smoke generator in the centre of the run. The first spraying of the area was completed by December 4th, 1945. The second spraying was carried out between December 15th and 20th, somewhat more bush on the outskirts of the Reserve being covered on this occasion. The third and final spraying of this series was conducted between January 9th and 15th, 1946.

Results of Earlier Spraying Experiment

The evaluation of the results attained by the three sprays laid down is by no means an easy matter because of the lack of any very effective means of determining the actual density of "fly." A large number of Harris traps had been maintained in the area for a number of years, the catches of which had been recorded on a monthly basis. For a month prior to the commencement of spraying, daily recordings of "fly" were instituted and the weekly totals from the various trapping areas submitted to headquarters. It was noted that the weekly totals showed a steady increase during November to a peak of 7,053 *G. pallidipes* for the week ending December 1st, 1945, in what was known as the high fly density area, in which 230 Harris traps were situated. In what was known as the low fly density area, in which 61 traps were sited, a total of 1,089 flies were recorded for this week.

In the high fly density area the catch at the end of the week during which the first spray was laid down dropped to 37·5 per cent. of the total recorded for the previous week. This decrease in flies was maintained so that the figure reached 19 per cent. after the second spraying and 14 per cent. for the week ending the completion of the third spraying. Thereafter the catches dropped further so that at the end of January a figure of 7 per cent. of the original total was reached. A similar decrease was noted in the low density area. From about the end of March a gradual increase in fly catches was noted in both the high and low fly density areas but even up to the commencement of the 1946 season's operations the pre-treatment level had not been reached. In the bushed areas surrounding the Reserve, which were included in the second and third sprayings, traps were placed shortly after the commencement of spraying and here similar decreases in the fly catches were noted and they have been maintained in all cases.

Observations conducted throughout the area by noting the activity of "fly" around motor vehicles and personnel were equally significant. Whereas at the commencement of spraying *G. pallidipes* was very numerous and annoying to ground parties, it disappeared to such an extent that even after the second spraying it could be found in its favoured haunts only with difficulty, and at the end of the third spraying could not be found at all.

It must be borne in mind, however, that, with the exception of light rains which delayed operations during the second spraying for a matter of two days, extremely dry conditions prevailed throughout the entire period of the three sprayings.

A peak may have been reached at the time of the first spraying as shown by the steadily mounting weekly fly catches during November and it is possible that the decreases in weekly totals thereafter may have been partially due to climatic conditions. In the eastern section of the Reserve which normally contains the highest concentration of game and "fly" the grazing deteriorated rapidly and some movement of game was observed towards the west where more dry grass was to be found. The movement of game could not be attributed to disturbance caused by the spraying operations as it was noted that the game were only very temporarily affected by the aircraft passing overhead and in any case the whole reserve was subjected to identical treatment. This migration of game did not appear to influence materially the incidence of fly, and the gradual increase in catches appeared to run parallel to each other in the high and low density areas, except that from late in June, 1946, until the commencement of the third series of spray tests in August, the highest catches were maintained in the low density area, whereas a decrease occurred in the high density area.

Heavy rains occurred in January, 1946, shortly after the completion of the third spraying and, in view of the rapid increase in leaf cover which followed these rains, it was decided to postpone operations until the winter months as it was feared that insufficient penetration of thicket by spray droplets would result as a consequence of this heavy overhead canopy.

The general conclusions arrived at were that the method of DDT dispersion in atomized spray form from aircraft for tsetse fly control could be regarded as satisfactory in areas not too extensive and where the terrain was such as to make the use of aircraft possible, and provided infiltration of fly from adjacent untreated areas could be excluded. Certain important conditions impose limitations on the use and manner of operating such a campaign. They are:—

1. In very dense thicket there is a definite danger of insufficient penetration of spray because of spray droplets being caught on the overhead canopy.

2. The method may be best applied only at the time of maximum leaf drop which restricts the time of spraying to the winter months only.

3. The spray must be finely atomized in order to make contact with the adult fly during periods of activity. It may be likened to a space spray which necessitates low flying in order to prevent excessive loss through evaporation, and this in turn restricts effective swathe widths to not more than 70 yards.

4. Spraying must be carried out crosswind, as flying into or downwind still further reduces the swathe width. This frequently complicates the practical application of the method, depending upon the topography of the country to be sprayed.

With these limitations in mind improvements in the mode of application of DDT were sought for in view of the further operations against tsetse flies contemplated for the dry season of 1946.

It was considered that the smoke or aerosol method of dispersion of DDT might be better than that previously used. A series of experimental test runs with aircraft was conducted in order to ascertain whether the introduction of highly concentrated solutions of DDT into the hot exhaust gases of the engines would result in the production of suitable smokes lethal to Diptera. A second consideration was whether aerosols so produced and liberated from a height practicable for flying over bushed areas would reach ground level in a lethal concentration.

The preliminary tests were conducted at Pretoria and excellent results were obtained using blowflies exposed in netting cages as test insects. Flying at heights of from 30 to 50 feet it was noted that in still air towards evening the smoke reached ground level in a matter of seconds after the aircraft had passed.

The results obtained were sufficiently encouraging to warrant a test of the method on tsetse flies in their natural environment in Zululand, and consequently a series of test runs in the Umfolozi Reserve was arranged early in July. Tsetse flies and blowflies were exposed in net cages under a variety of conditions and it was demonstrated that *G. pallidipes* showed a considerably higher degree of susceptibility to DDT in aerosol form than the blowflies. At the same time it was noted that except where thermal conditions prevailed the smoke descended to ground level very satisfactorily. Wind tended to disperse the smoke rather rapidly although even in wind of a velocity of up to four or five miles per hour fairly satisfactory results could be expected.

Later Modifications of Spray Apparatus

The apparatus as finally adopted, fitted to twin-engined Anson aircraft, consists of fuselage tanks of 200-gallon capacity the contents of which are fed by gravity through unmodified tubes of five-eighths of an inch inside diameter directly into the exhaust manifold of each engine about one and a half inches from the confluence of the two arms of the exhaust ring pipe. The stubs of the exhaust manifolds are extended by means of a sheet metal stock of the same diameter as the stub for a distance of approximately eight feet backwards past each engine nacelle. The hot exhaust gases from the seven-cylinder Gypsy IX engines give almost perfect sublimation of the DDT in the form of a dense white smoke although a small quantity of fluid in extremely fine particles may be detected.

The DDT solution used consists of 20 per cent. of the technical product (or 16 per cent. of the para para isomer) dissolved in four parts toluene and seven parts C.I. fuel oil. This is fed at the rate of five gallons per engine per minute and represents an output of ten gallons per aircraft per minute or 16 lb. of p.p. isomer DDT per minute. At a speed of 120 m.p.h. the aircraft covers approximately 50 acres per minute, assuming a swathe width of 70 yards. This represents a theoretical application of ·32 lb. p.p. isomer DDT per acre or one gallon of the concentrated solution in smoke form per five acres.

Between August 7th and 14th, 1946, the aerosol method of DDT dispersion from aircraft was tested in the Mkuzi Reserve and the whole area, including all the surrounding bushed areas in which the presence of tsetse flies had been demonstrated, was treated. This represented an area of approximately 40 square miles. Many practical difficulties were encountered, chief amongst which were adverse weather conditions, but the entire area was covered in some ten hours of flying from the afternoon of August 12th to the morning of August 14th, 1946.

Experience soon showed that the very early mornings from dawn until 6.30 or 7 a.m. on bright days, with extensions of one to three hours on overcast days, offered the best spraying conditions

Hardly any wind was encountered and the smoke sank immediately into the bush after emission and remained there as a mist for periods of up to two hours before being dissipated by diffusion and slight air currents. As suitable conditions for application were limited it was essential to make the best possible use of the aircraft available and it was found possible to utilize up to eight aircraft simultaneously. Spraying was conducted at right-angles to whatever drift of air there was, the leading aircraft commencing its run to leeward of the area to be sprayed and the other aircraft following upon the visible smoke trail to windward of the leader 200 to 300 yards behind each other and spaced at 70-yard intervals parallel to each other. The return run of the leading aircraft was timed in such a way that it commenced spraying immediately after the last aircraft had completed its run, a compass and gyro course being set to ensure parallel reciprocal courses. In this way the smoke drifted clear of all aircraft and obviated the necessity of aircraft flying through the smoke trail of preceding machines which, otherwise, tended to obscure windshields and seriously to impair visibility. Flying was conducted at the lowest practicable height consistent with safety. Sorties were so arranged that a fixed ground point was reached when spray supplies were exhausted, in order to ensure continuity of application after refilling. Failing such a fixed point an observer on the ground marked the run of the last aircraft and this was indicated to the leading aircraft by means of a smoke generator at the commencement of subsequent sorties.

Later Results of the Spraying

At the commencement of operations in August, 1946, a moderate density of *G. pallidipes* was found to be present in the Reserve, which at the same time contained a high game density, including several black rhinoceroses. Flies were collected and exposed in net cages in various situations including placing in extremely dense thickets. In two exposure experiments under very adverse conditions, during which wind of up to six miles per hour was blowing, 100 per cent. mortality resulted in one case and 85 per cent. in the other. After these initial experiments it was impossible to obtain any further tsetse flies for exposure over the whole area although daily attempts were made to obtain them.

The following table gives the actual catches made up to date and recorded at weekly intervals in 356 Harris Fly Traps situated as indicated:—

Table I

Tsetse Flies Catches—Mkuzi Reserve

Catches for week ending:	High density area	Low density area	Extension area					Western section	Total	Remarks
	230 traps	61 traps	E (10 traps)	G (10 traps)	H (10 traps)	I (5 traps)	J (12 traps)	K (18 traps)		
1.12.45	7,053	1,089							8,142	First fluid spray, 30.11–4.12.45
8.12.45	2,647								2,647	
15.12.45	1,842								1,842	
22.12.45	1,324	169	677						2,170	Second fluid spray, 15–20.12.45
29.12.45	1,207	104	377						1,688	
5.1.46	1,169	144	450	20	399				2,182	
12.1.46	1,181	96	306	49	395	51			2,078	Third fluid spray, 9–15.1.46
19.1.46	955	67	227	42	260	83	3	11	1,678	
26.1.46	826	73	164	52	266	87	3	10	1,481	
2.2.46	507	47	103	54	193	26	1	5	1,036	
9.2.46	683	73	52	78	65	32	8	6	997	
16.2.46	446	80	90	89	81	86	15	3	890	
23.2.46	720	155	124	183	149	102	6	3	1,442	
2.3.46	669	162	85	164	100	96	7	1	1,284	
9.3.46	904	132	86	170	85	54	4	4	1,439	
16.3.46	783	154	39	94	30	43	11	11	1,165	
23.3.46	682	153	46	80	35	44	9	9	1,058	
30.3.46	678	173	41	79	46	41	20	10	1,088	
6.4.46	573	192	35	68	32	39	6	7	952	
13.4.46	625	277	38	53	15	84	5	2	1,099	
20.4.46	982	200	24	63	49	68	1	—	1,447	
27.4.46	986	304	15	46	29	59	—	—	1,439	
4.5.46	991	189	17	32	46	34	1	—	1,310	
11.5.46	1,254	295	33	73	62	48	2	3	1,770	
18.5.46	1,291	272	20	20	13	7	—	1	1,624	
25.5.46	1,301	396	26	35	23	17	—	1	1,799	
31.5.46	1,074	479	20	29	20	8	—	—	1,530	
8.6.46	902	306	20	44	25	12	1	2	1,312	
15.6.46	859	428	15	33	20	12	1	—	1,368	
22.6.46	565	538	19	4	15	3	1	1	1,146	
29.6.46	689	665	2	9	4	3	—	—	1,372	
6.7.46	545	545	11	9	5	2	1	1	1,122	
13.7.46	636	655	2	6	—	—	—	—	1,299	
20.7.46	657	762	4	4	1	—	—	2	1,430	
27.7.46	629	761	3	4	—	—	1	1	1,399	
3.8.46	614	763	8	2	3	—	1	1	1,392	
10.8.46	353	874	1	4	—	—	—	3	1,235	First smoke application, 13.8.46
17.8.46	47	156	4	1	1	—	—	3	212	
24.8.46	18	34	—	2	—	—	—	1	55	
31.8.46	25	56	—	1	—	1	—	—	83	Second smoke application, 30.8.46
7.9.46	15	13	—	1	—	—	—	—	29	
14.9.46	17	91	—	1	—	—	—	1	110	Third smoke application
21.9.46	15	68	—	—	—	—	—	—	83	
28.9.46	29	94	1	1	—	—	—	1	126	
5.10.46	87	111	3	3	—	—	—	—	201	Fourth smoke application, 3.10.46
12.10.46	63	53	—	1	—	—	—	—	117	
19.10.46	97	42	1	1	1	—	—	—	142	Fifth smoke application, 17.10.46
26.10.46	44	29	2	—	—	—	—	1	76	
2.11.46	21	2	—	—	—	—	—	—	23	Sixth smoke application, 10.11.46
9.11.46	15	4	—	—	—	—	—	1	20	
16.11.46	11	2	—	—	—	—	—	—	13	Seventh smoke application, 15.11.46
23.11.46	1	7	—	—	—	—	—	—	8	
30.11.46	2	11	—	—	—	—	—	1	14	Eighth smoke application, 29.11.46
7.12.46	4	—	—	—	—	—	—	—	4	
14.12.46	3	2	—	—	—	—	—	—	5	
21.12.46	1	—	—	—	—	—	—	—	1	
28.12.46	2	1	—	—	—	—	—	—	3	
4.1.47	—	2	—	—	—	—	—	—	2	
11.1.47	1	—	—	—	—	—	—	—	1	
18.1.47	2	1	—	—	—	—	—	1 (A)	4	
25.1.47	6	3	—	—	—	—	—	—	9	

It will be noted from Table I that following upon the application of the fluid sprays an initial drop in fly catches occurred in the high and low "fly" density areas, reaching lowest point at about the end of March, 1946. Thereafter a slight rise occurred followed again by a decline in catches, but the figures remained fairly constant for the five to seven weeks prior to the commencement of the aerosol applications in August, 1946, when a marked drop occurred.

In the Extension Areas and Western Section the fluctuations were not so apparent and a steady decline in catches had occurred which had almost reached exhaustion point prior to the commencement of the aerosol applications.

TABLE II

TSETSE FLY CATCHES—HLUHLUWE RESERVE

Catches for month	*G. pallidipes*	*G. brevipalpis*	Total
1945—			
November	70,194	1,042	71,236
December	72,839	1,172	74,011
1946—			
January	48,759	487	49,246
February	28,181	639	28,820
March	38,927	726	39,653
April	39,230	782	40,012
May	78,443	1,643	80,086
June	65,355	2,170	67,525
July	61,726	1,210	62,936
August	84,937	972	85,909
September	40,728	580	41,308
October	30,114	361	30,475
November	28,962	229	29,191
December	—	—	—

Table II gives the fly catches over the same period for the Hluhluwe Reserve which, as stated previously, was regarded as an untreated control area although not strictly comparable on account of a considerably higher rainfall and more luxurious vegetation.

The tentative general conclusions which may be drawn from the above figures, which are further supported by visual observation throughout the entire period, are as follows:—

By virtue of suitable vegetational and soil conditions and a large permanent population of host animals the high and low "fly" density areas may be regarded as permanent haunts of *G. pallidipes* in which breeding has taken place actively since time immemorial. This view is supported by the fact that, over four months of applications of DDT applied at intervals designed to prevent further depositions of larvae, were required to exhaust the unhatched pupae assumed to have been present at the commencement of operations in August. (Exposure of freshly formed pupae under natural conditions in Zululand had shown that emergence of adult flies might be delayed in winter up to four and even five months.)

It is likely that comparatively little breeding has taken place in the extension areas. The high incidence of "fly" in some of these areas when trapping was commenced may have been due to infiltration from the breeding areas. As far as can be ascertained these areas do not carry a large permanent game population, but game animals move into them from time to time. The almost complete disappearance of "fly" from these areas encountered at a comparatively early stage may possibly be accounted for by reduction of the "fly" in the breeding areas, which may have served as the source of these dispersing flies, together with a lack of pupae from which new flies could have hatched.

Although total eradication has not yet been achieved, the tsetse fly incidence, as revealed by Harris "Fly" Trap catches, together with careful observations, has been reduced to a level at which it may be hoped that the natural mortality to which the adult and immature stages are exposed may result in total elimination of this slow breeding parasite.

ACKNOWLEDGMENTS

We wish to record our thanks and appreciation to the many individuals who have co-operated in the work and also to the institutions, without whose assistance this experiment would not have been possible. In the first place to Dr. G. de Kock, Deputy Director of Veterinary Services at Onderstepoort, our thanks are due for help and advice throughout; to the clerical staff of Onderstepoort and in particular Mr. de Witt for unfailing assistance with the administrative side of the organization; to Capt. Shenton of this Division whose intimate knowledge of the country has been invaluable and who has been present throughout the operations and assisted most ably; to the Chief of the General Staff of the South African Air Force for placing the aircraft at our disposal and to the technical staff of No. 1 Air Depot for advice and the modification of the aircraft and construction of the spraying equipment; to the Survey Section of the South African Air Force for supplying aerial survey maps of the area which were of great assistance; to the pilots whose enthusiasm and excellent co-operation played an all-important role in the results achieved; to Dr. Orchard of the Division of Chemical Services for valuable assistance in evolving a satisfactory spraying technique and to Klipfontein Organic Products who were responsible for the manufacture and regular supply of the DDT and the spray solutions used.

Poliomyelitis and Virus Disease of Dogs

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We have witnessed in the last few months an unusual epidemic of poliomyelitis (infantile paralysis) among the human population. It has appeared rather significant to me that during those same months veterinary surgeons have been puzzled by a simultaneous epizootic of unexplained nervous disease among dogs, and particularly among greyhounds. It may be intrepid on my part to make the suggestion that there is any connection between these two outbreaks; indeed, the current medical and veterinary knowledge and opinion seems definitely to negative such a view, as the specific causative virus is said not to attack dogs, although monkeys and rabbits are susceptible.

As a clinician, I have come to the increasing belief that the symptoms in one species are synonymous with many to be observed in the other, and I would need convincing by a pathologist that it was impossible for the ultra-microscopic organism of poliomyelitis to attack the anterior horn cells of the grey matter of the dog's cord.

At the latter part of last year a rather alarming number of valuable racing greyhounds—mostly between nine and 24 months old—were exhibiting unaccountable and unusual derangements of the nervous system. As in the human being, very seldom were all the varied symptoms common to the disease seen in one animal, but if a series of cases was taken it would have been possible to find almost all of the symptoms described as occurring in man. For instance, one dog would show a mild fever, with exaggerated depression, sore throat, stiffness and anorexia, ending with fits; another would show the most severe convulsions, fit following upon fit in rapid succession (in one case every ten minutes until it died). When it was possible to subdue these, paresis or paralysis ensued, and the animals usually succumbed, probably as a result of respiratory paralysis.

In several cases, dogs which had been distemper-immunized early in life and had never contracted distemper, have gone down with so-called chorea which has progressed to the convulsion stage and death. More than one has shown undoubted wasting of the thigh muscles, and one dog (at present in hospital) developed chorea, unassociated with distemper, and a marked atrophy of all the muscles of the off hind leg. This dog is to be destroyed, as so many others have been; and it becomes a very serious matter indeed when one witnesses such decimation among dogs which quite commonly cost anything up to £1,500 or more. Veterinary surgeons have no name for the condition and certainly no reliable treatment. There is, however, a widespread belief among many of them that an unknown virus is taking hold of our canine population. With this thought in mind last autumn I sent two moribund greyhounds to a well-known research laboratory for a diagnosis. The report was, briefly, to the effect that distemper virus was found in one dog and an unknown virus in the other. It is this unknown virus (which I contend *may be* that of poliomyelitis) which has given rise to the belief in some minds that the biologics used in anti-distemper immunization have been to blame. Possibility of breakdown with the latter cannot, of course, be entirely eliminated, but is there not a strong case for organized investigation into the whole matter? Our knowledge of these intricacies has not yet reached finality and further investigation on these lines might be most illuminating.

May we now, for purposes of comparison, briefly review the disease as affecting the human being:—

1. "Recent evidence has shown that the virus of poliomyelitis appears in the faeces for some days or even weeks after onset of the infection, and that the virus probably reaches the central nervous system from the bowel, since it has been demonstrated in the abdominal sympathetic ganglia. In the pre-paralytic stage of the infection, characterized particularly by fever and irritability,

gastro-intestinal symptoms may be present, although they are not usually prominent features. The modern view is that the majority of patients affected with the virus of poliomyelitis develop only these pre-paralytic symptoms, and such cases are called 'abortive' poliomyelitis. What determines the development of the paralytic stage in the minority of cases is still unknown, although severe muscular exercise is probably an important predisposing factor."[1]

[*Comment*: We often note fever, irritability and gastro-intestinal symptoms in dogs which, later, manifest affections of the nervous system—in some cases extending to paraplegia. This syndrome would, of course, be common to distemper, but it has been observed also in dogs in which, on pathological investigation, no distemper virus could be demonstrated. It is significant that severe muscular exercise should be regarded by the medical profession as the culminating factor in the production of the paralytic stage, in view of the fact that this mysterious nervous disease is so comparatively common in racing greyhounds.]

2. "The evidence indicated that in perhaps 98 per cent. of cases poliomyelitis is a mild, widespread, highly communicable disease of young children leaving no residual paralysis. Transient paralysis occurs in about 5 per cent. of all cases and the meningitic form in about 14 per cent. Residual paralysis seems to be infrequent, affecting probably not more than 2 per cent."[2]

[*Comment*: Most of our veterinary cases seem to occur in animals under about two years of age; and, of course, the majority do not contract a residual paralysis, though quite a few show a transient one. The meningitic symptoms are common.]

3. "In some patients a marked meningeal reaction at the onset and a prolonged pre-paralytic stage have led to a diagnosis of meningitis or meningo-encephalitis."[3]

[*Comment*: This is precisely the diagnosis which is so often adopted in the case of dogs; but it may not be a true one, in the light of the medical evidence.]

4. "Suspicion is aroused when stiffness of neck or spine occurs during an acute infection with moderate fever in a child, young adult, or occasionally an older person. Drowsiness alternating with irritability, hyperaesthesia, and exaggerated muscular reflexes may be present. Later, in a frank case, there is diminution of some reflexes and weakness of some muscle group. Any of the symptoms mentioned may be absent, and it should be realized that infection with the virus of poliomyelitis may produce only a minor illness that cannot with certainty be diagnosed as poliomyelitis."[3]

[*Comment*: The above picture is much the same as one may often see in sick dogs. It is doubtful whether anyone has thought of searching for the poliomyelitis virus in dogs dying or dead of meningeal and paralytic attacks.]

5. "In dealing with a suspicious case it is advisable to isolate the patient because infectivity is probably greatest during the pre-paralytic stage."[3]

"The disease is spread by the agency of flies; by contamination with faecal matter (perhaps swimming in sewage-polluted rivers)[4]; and by coughing or blowing, as the virus is present in the throat of patients during the acute stage and during the incubation period."[3]

"Food contaminated by infected flies was found to produce the disease when fed to chimpanzees."[5]

[*Comment*: Dogs have every opportunity of faecal contamination, but whether it must be from a human or animal source remains to be ascertained.]

6. "There is no specific treatment. Neither drugs, antibiotics, convalescent serum, nor any other treatment has been proved to decrease the incidence of paralysis, or to limit its spread."[6]

[*Comment*: This has been my own experience in a large number of cases. Paralysis which, as all readers know, is so rife among dogs (but not cats), is usually clouded in obscurity as regards its etiology; and it is depressing to realize how little we can really do for such cases.]

I frankly admit that I, as a clinician, have little right to advance theories which possibly may be untenable in the light of modern pathological knowledge; but I am quite prepared for any rebuffs and would welcome a frank and practical review of the whole problem by any specialist who would subjugate bias in favour of an absolutely open mind.

References

1 *Brit. Med. J.* (1947.) July 12th, p. 81.
2 *Ibid.* (1947.) September 13th, p. 424.
3 *Ibid.* (1947.) July 26th, p. 135.
4 *Ibid.* (1947.) August 9th, p. 226.
5 Ward, R., Melnick, J., & Horstman, D. (1945.) *Ibid.* **101.** 491.
6 *Brit. Med. J.* (1947.) July 26th, p. 135.

CLINICAL COMMUNICATION

A Case of Ergotism in Calves Resembling Foot-and-Mouth Disease

by

N. S. BARRON and A. A. KIDD

History.—A batch of 25 yarded calves, nine to 12 months of age and of both sexes, was turned out into a second year ley, from which a hay crop had been cut two weeks previously. They spent most of their time browsing around the hedgerows and cropping the hedge and the coarse vegetation there. The owner remarked that during this period the calves had not thrived as well as expected. So little did they like this field, which to the eye appeared green and attractive, that seven broke through to a field in which there were 26 empty heifers and six in-calf animals varying in age from one to 2½ years.

On Tuesday, August 5th, 1947, a fortnight after the animals had been turned out, the veterinary practitioner was called in as about six animals were very lame and obviously distressed, three or four others being slightly lame. Close observation revealed not only lesions on the feet but also some of a crusty nature on the muzzle of at least nine animals. Foot-and-mouth disease was immediately suspected and reported.

Inspection by an official of the Animal Health Branch of the Ministry of Agriculture, however, did not confirm this diagnosis and accordingly a further investigation was commenced.

Symptoms.—A number of the animals were lame on one or two feet and showed the muzzle lesions described below. The temperatures of four were all in the region of 105° F. There was no salivation. Though a number of the animals which broke through to another field had marked muzzle lesions, the condition was not transmitted to the older cattle.

Lesions: *Muzzle.*—In the early stages the lesion was pustular in nature but quickly became necrotic with, in some cases, slight cavity formation. In the latter stages, distinct rings (varying in size from a few mm. to 20 mm.) could be observed mottling the epithelium. The appearance of these resembled those commonly found on the teats of milking cows and passing as "cow-pox." They appeared as red or brownish circles, with normal or healing epithelium in the centres. In other cases the ring formation was less distinct, the muzzle appearing to be covered by an irregular, brownish deposit. On scraping this, a shallow, raw wound was created. These *lesions were not found within the mouth*, though some could be detected under the upper lip, anteriorly to the dental pad.

Feet.—Generally one foot, though never more than two, was affected. The coronet appeared to be deeply underrun on one or both claws and lesions of a necrotic nature in some cases spread upwards covering an area the size of several half-crowns. Firm, rather painful swellings were sometimes present in the fetlock or cannon region. The sensation resembled that experienced when handling a freshly formed haematoma.

Treatment.—The animals were forced to walk through a bath containing 10 per cent. copper sulphate. After the first two occasions they did this willingly. This procedure was carried out twice daily for four days and thereafter once a day for nine days, when recovery was complete. The febrile condition was of not more than two days' duration, during which time the animals were somewhat dull. Following this they behaved quite normally.

A possible clue to the cause was given in the article by L. E. Hughes[1], published when the investigation was commencing. Though we do not feel that the condition with which we were dealing was the same as recorded by him, and considered to be associated with clover, there is some similarity. The author, however, referred to the letter by Peter M. Flodin[2] in a postscript, and the association of the two put us in a more favourable position than Hughes at the time of commencement of our investigation.

Investigation

An inspection of the field concerned was carried out in great detail. The majority of the hedgerow grasses had been eaten and the remaining heads of cocksfoot, Yorkshire fog and a number of other coarse grasses, were so dry that one would not have expected any ergot pods to be left. Moreover, the ground was heavily trampled, which would have encouraged their shedding. The herbage of the field was close and green and consisted mostly of various rye-grasses with a sprinkling of weeds but no clover. Flowering heads of rye-grass were relatively sparse, but it was possible to find grasses affected with ergot over most of the field. It was very noticeable that the pods found were on the mature grass heads, *i.e.*, those which were browning off. It was reasonable

to assume that the field itself was widely infested with ergot. The field in question had been arable for at least ten years before being ploughed up in 1945, when a seeds mixture was put down with a covering crop of wheat. As the farm had changed hands it was not possible to find out what the mixture was, but clover was absent from the field at the time of the outbreak here described. The ley was cut late in 1946 owing to bad weather, and again in 1947 in early June. Two weeks later the bunch of calves under discussion was introduced and developed alarming symptoms in a further 12 to 14 days. The farmer produced some barley from another field on the farm, which was also affected with ergot. Despite the wide distribution of this fungus on the farm, there was no history of abortion having occurred recently, although several animals calved prematurely three years ago, which, however, could be attributed to *Brucella abortus* infection.

On discussing the problem with a mycological colleague, we were led to understand that ergot is widely distributed over the country and can be found in varying degrees, almost anywhere, contaminating the land and the graminaceous crops thereon. From the extensive work on Ergotism by Barger[3], it would seem that the effects of ergot may take the convulsive form or the gangrenous form, but that a combination of these may occur, together with a wide variety of other symptoms depending upon the dosage, the alkaloids present in the particular species and the actual nutritional state of the individual affected. Symptoms of "vesicle formation on hands and feet (due to trophic disturbance of a nervous kind as in Herpes zoster) . . ." are mentioned as not infrequent. Elsewhere[4] it is recorded that "Ergotism is distinguished from foot-and-mouth disease and from mycotic stomatitis by the lack of lesions in the mouth. . . ." Bersey[5] describes an outbreak of ergot in Kansas in 1883-86 that was so severe as to have been taken for foot-and-mouth disease.

It would appear, therefore, that ergotism may, on occasion, closely resemble foot-and-mouth disease in certain respects, and that confusion between the two conditions has occurred more than once in the past. Though the calves which broke through into the field with the older cattle were themselves affected badly, none of the latter became affected or showed any signs of the illness, a factor which strongly suggested that the condition was not contagious. In our view the circumstances relating to this case, together with the lesions observed, appear to justify a diagnosis of ergotism.

REFERENCES

(1) HUGHE, L. E. (1947.) *Vet. Rec.* **59**. 391-2.
(2) FLODIN P. M. (1947.) "Ergotism in New Zealand" *Ibid.* **59**. 293.
(3) BARGER, G. (1931.) "Ergot and Ergotism." Gurney and Jackson. London.
(4) U.S. Dept. Agric. Bureau Animal Industry: "Special Report on Disease of Cattle." 69-70
(5) See BARGER, G. p.102.

ABSTRACTS

[Early Diagnosis of Gestation in the Mare by the Method of Kurossava. (Trans. title.) LESBOUYRIES & WIKTOR, T. (1947.) *Rec. méd. vét.* **123**. 5.]

This work is a continuation of the method employed by the Japanese worker Kurossava for the early diagnosis of pregnancy in the mare. Kurossava's technique and findings are reported in detail, and also the results obtained by subsequent workers such as Barulin and Burdenko in 1935, Ninakow in 1936, and Day and Miller in 1937-38. The mares were examined from the time of service till it was possible by biological tests to establish the existence or absence of gestation. The biological tests used were the Friedman-Schneider and the Aschheim-Zondek.

The essentials of Kurossava's method are regularly to examine both the state of the vagina and cervix, and the microscopical appearance of samples of mucus obtained from them.

The vulva and external genitalia are cleaned and disinfected, then a speculum is introduced. The state of the vagina and cervix is carefully noted, and a sample of mucus is removed, using a horn spoon having a handle 40 cm. in length. This spoon is washed in alcohol and ether both before and after use. To obtain the mucus the spoon is moved back and forward on the mucous membrane, especially in the area of the cervix. The removal of mucus is found to be difficult up to the twentieth day after service, as it is small in quantity and tends to be adherent to the mucous membrane.

The sample of mucus, when obtained, is placed on previously greased plates. Direct smears are made and they are allowed to dry in the air. The smears are stained with either giemsa or haemotoxylin and eosin. From February till May, over 150 examinations, both clinical and microscopical, were made on up to 30 mares. Several of the mares were examined every third day, the remainder two or three times.

The results obtained agreed largely with those of other workers, but there were several points of difference.

In the Non-pregnant Mare

From the 21st to 30th days a non-pregnant mare shows either a congested cervix, with the folds of the vagina relaxed, or a cervix which is oedematous and smooth, covered with abundant mucus which is fluid and transparent, and gives a glossy appearance to the mucous membrane. In the first case, cellular elements are rare in the mucus, and are represented by several ciliated cells, without nuclei, and by several keratinized masses. Leucocytes are rare or absent.

In the second case, a large number of leucocytes and several keratinized cells are found.

In the Pregnant Mare

The cervix is tightly closed. The vaginal mucous membrane is dull, and the cervix is always very much paler than the rest of the mucous membrane.

The mucus shows active ciliated cells with marked nuclei, staining blue. The balls of mucus, characteristic of pregnancy, do not appear till the 40th day. Kurossava observed them after 15 days. The French workers also found that there did not seem to be the marked resistance to the passage of the speculum in the pregnant mare, as reported by Kurossava.

They conclude by saying that it is possible to recognize pregnancy in the mare about the 21st day and more certainly after the 40th day, by carrying out a macroscopical examination of the vagina and cervix, and a microscopical examination of the mucus found therein.

G. C. B.

* * * * *

[General Anaesthesia of Sheep. (Trans. title.) LAGNEAU, F. (1947.) *Rec. Méd. Vét.* **123**. 103.]

This paper reviews the various methods of producing general anaesthesia in sheep, a procedure finding greatest employment in various operations performed in studying the physiology of digestion in this species.

The following anaesthetic agents are discussed: ether, chloroform, nembutal, chloralose, and chloral hydrate, the first two given by inhalation and the others by intravenous injection. A detailed account is given of the anaesthesia of five sheep with chloral hydrate; one death occurred and was considered to be due to a too rapid injection.

The author considers the following precautions necessary when anaesthetizing sheep: the prevention of excessive salivation with atropine, the avoidance of inhalation of regurgitated ingesta by suitable positioning of the patient, and the relief of tympany.

References are given to 12 original papers.

F. A.

* * * * *

[Canine Leptospirosis. RANDALL, R. (1947.) *Univ. Penn. Bull. Vet. Ext. Quart.* No. 106. pp.49-57.]

Although 16 strains or species of Leptospira have been reported from all parts of the world, only two strains, *L. canicola* and *L. icterohaemorrhagiae*, are known to infect human beings, and dogs in the United States. The majority of leptospiral infections of dogs in the United States are caused by *L. canicola*, but the true incidence of canine leptospirosis is not known.

Two clinical forms of leptospirosis are recognized; the icteric type and the haemorrhagic type. Both forms have been recognized in *L. canicola* and *L. icterohaemorrhagiae* infections.

The illness is usually sudden in onset and severe in its manifestation. Definite diagnosis is dependent on laboratory means, including agglutination tests. In the dog, leptospirae circulate in the blood stream during the first week of the disease. They disappear during the second week but at that time begin to appear in the urine. In this author's experience darkfield examination of dog's blood and urine has not given clear-cut findings. Direct culture methods were also disappointing. Biological testing by injecting whole blood or urine into young hamsters consistently yielded satisfactory results.

Agglutination tests also proved satisfactory after infection was well established. A macroscopic agglutination titre of 1:100, or higher, is regarded as positive.

Immune serum if employed early in the course of the disease is effective in lowering the mortality rate. Sulphonamides apparently do not alter the course of the disease. Penicillin in doses of 10,000 to 15,000 every three hours until 200,000 units have been given is said to result regularly in recovery.

The potential danger of dogs acting as reservoirs of *L. canicola* and infecting human beings is discussed, two proven cases being described in detail.

G. F. B.

Questions and Answers

The submission of questions for inclusion in this column will be welcomed: they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Verminous Aneurysm in the Horse

Q. CCXIX.—*Is there any method of diagnosing the presence of verminous aneurysm in the horse during life?*

A.—It is possible to make a positive diagnosis of verminous aneurysm about the root of the cranial (anterior) mesenteric artery in the pony and average-sized horse during life by rectal examination.

The arm of the operator should first locate the origin of the iliac arteries, then proceed along the ventral aspect of the aorta, slightly to the left of the mid-line, until the posterior pole of the left kidney is reached; the root of the cranial mesenteric artery lies immediately to the right of, and slightly anterior to, this pole. If affected with aneurysm, the most ventral portion of the growth can be palpated as an irregularly shaped growth, which is either itself pulsating or can be traced as continuous with a pulsating vessel. (See *Vet. Rec.* **53**. No. 20. 275.)

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Parathyroid Extract in Prevention of Milk Fever

Q. CCXX.—*As the parathyroid gland influences the calcium metabolism in the body, would the administration of parathyroid extract to a pregnant cow a week or so before calving have any effect in preventing milk fever? Has there been any research in the prevention of milk fever as compared with radical treatment just at the time of calving?*

A.—The fundamental change behind the milk fever syndrome is metabolic, *i.e.*, a liver injury, with fatty infiltration. Guanidine is produced which lowers the blood calcium—possibly by an inhibition of the parathyroid (whose function is to control *normal* blood calcium levels)—and thus prevent rapid mobilization of calcium from the skeletal reserves. The temporary dysfunction of the parathyroid in milk fever is argued purely from the existence of hypocalcaemia. Therefore, injection of parathyroid extract in milk fever would not act quickly enough, and the injection of calcium to restore the blood-calcium level quickly and allow normal control to be regained, remains the treatment of choice. Since it only controls normal levels, injection of parathyroid extract would have no effect as a preventive, unless one could gauge the *exact* time of onset of symptoms and inject the parathyroid at the appropriate interval in advance. Even if this were possible, extra parathyroid would not raise blood-calcium levels while the parathyroid balancing mechanism was working normally.

The protein background must therefore be investigated when considering the prevention of milk fever. Most dairy cattle are now underfed: even if enough protein is provided there is usually not enough carbohydrate to deal with the fats synthesized in the liver. The present respondent is of the opinion that the best immediate preventive of milk fever is a dose of ½ to 1 lb. of glauber salts immediately after calving.

* * * * *

Pathology of Chorea

Q. CCXXI.—*What is the pathology of chorea as seen in the dog? I had assumed there to be permanent damage to nerve tissue by a virus, but the excellent results of treatment with vitamin B_1, as reported by Mr. Townson in your issue of April 26th, have altered this opinion. In these cases how does vitamin B_1 effect its cure?*

A.—Chorea is considered to be due to disease of the basal ganglia, but as in epilepsy, many investigators have affirmed that there is no discoverable lesion upon *post-mortem* examination. The questioner seems right in assuming that there is permanent damage to nerve tissue, probably by a virus, as cure is rare. In spite of one or two reports of resolution of *supposed* chorea by administration of vitamin B_1, the respondent (and a number of his colleagues) cannot accept that such therapy is, in fact, a cure. He personally has tried it in massive doses without success.

From the observations and reports of numerous clinicians and laboratory workers, vitamin B_1 deficiency is held accountable, wholly or in part, for the following conditions: anaemia, anorexia, arthritis, blindness, constipation, cramp, fatigue, fretfulness, leg weakness (not due to rickets or osteomalacia), loss of weight, nervousness, neuralgia, polyneuritis, and degenerative lesions of the spinal cord, *e.g.*, chorea, paraplegia, and symptoms simulating senile decay. It is not for one moment intended to convey that all these conditions arise only as a result of vitamin B deficiency, but that where the latter actually exists, they are likely to follow. Thus, any apparent improvement in chorea may be looked for after the administration of vitamin B when *and only when* a deficiency has been definitely established. Such a deficiency is, however, really a rare occurrence. The writer is unable to explain how a vitamin may exert its specific effect, except to say that certain cells need certain foods or chemicals for their maintenance, and that vitamin B is an essential to the nervous system.

* * * * *

Caponizing of Cockerels by Stilboestrol Implant

Age.—Birds of any age, including adult cocks, may be caponized, but the age of choice is just prior to the development of secondary sex characters, *i.e.*, 12 to 16 weeks in light and 16 to 20 weeks in heavy breeds.

Technique.—The bird is restrained on its right side, the assistant holding the head and neck extended by crooking two fingers behind the head. Separation of the plumage on the lateral aspect of the neck immediately behind the head will reveal an area relatively free of feathers, thus obviating plucking. Surrounding feathers are damped down by pouring spirit over the selected site; this also serves to show up the cutaneous blood vessels.

A fold of skin free of vessels is picked up with dressing forceps and a "snick" transverse to the long axis of the neck and about ¼ inch long is made with sharp scissors. The pellet of stilboestrol is inserted through the incision using dressing forceps, preferably the canine aural forceps type, and is pushed through the subcutaneous tissue upwards towards the head. The forceps are then withdrawn, leaving the pellet *in situ* some ¼ to ½ inch above the incision. Care should be taken not to break the pellet as these are somewhat friable. The incision is closed with two interrupted or one mattress suture using No. 1 silk; these need not be removed.

Dose.—One pellet comprising 30 mgm. pure stilboestrol with no excipient. If the bird is to be kept until well over maturity a repeat implant may be needed.

Fee.—The fee so far charged has been the same as that for surgical caponizing, *viz.*, 1s. 6d. per bird, provided a reasonable batch is done at one time. It must be pointed out, however, that the pellets used so far have been provided free of charge for clinical trial and the cost of producing the desired 30 mgm. pellet on a commercial basis, if the demand warrants such a course, is not yet known. The fee may, therefore, have to be adjusted when this is known.

Comment.—Caponizing has been carried out during the war and post-war years mainly to enable backyard poultry keepers to rear cockerels without fighting and crowing, and if necessary to run the cockerels with the hens. Such birds are usually killed at five to eight months old and although their weight compares favourably with that of uncaponized birds they have not reached their maximum carcase weight. There is some evidence that live weight gains per unit of food are greater than in untreated birds even at this age. Best results are obtained by keeping heavy breed capons until at least 12 months of age, re-implanting if necessary, when the dressed carcase will reach a weight of 10 to 12 lb. or more, the flesh being of excellent quality.

JOAN O. JOSHUA.

[The above note on chemical caponizing has been prepared in response to the widespread interest caused by material already published in these columns and the numerous enquiries regarding technique, etc., received by Miss Joshua and Messrs. Burroughs, Wellcome & Co.—*Editor.*]

DISCOVERY OF PENICILLIN "SHEER FORTUNE"

Sir Alexander Fleming, speaking at the opening of the Pharmaceutical Society's College in London recently, told the story of his discovery of penicillin, and said the beginning of penicillin was sheer fortune.

There had been many stories in the newspapers about the origin of penicillin. Some of these were related by Sir Alexander, who then continued: Actually, what happened was that a blue mould—a penicillium—which he did not want, came from somewhere and contaminated a culture plate of bacteria. This often happened in a bacteriological laboratory, for these mould spores blew about in the air and settled anywhere. But on this particular occasion the mould which developed appeared to be dissolving the bacteria. That was very unusual, and the more he investigated it the more interesting it became. He found that the mould made a powerful and non-poisonous antiseptic which he named penicillin. If his mind when he saw the mould had been occupied with other things he would have missed it. He might have been in a bad temper—or have had a quarrel with his wife that morning. Then he would probably have thrown away the culture and thought no more about it.

NOTES AND NEWS

Diary of Events

Oct. 29th.—Meeting of the Scottish Metropolitan Division, N.V.M.A., at the Royal "Dick" Veterinary College, Edinburgh, 2.30 p.m.

Oct. 29th.—Meeting of the Ayrshire Division, N.V.M.A., at Ayr (Hannah Institute), 2.30 p.m.

Oct. 29th.—Meeting of The Farmers' Club, at the Royal Empire Society, 2.30 p.m. (Mr. Clyde Higgs: "Dairy Farming Changes Ahead.")

Oct. 30th.—Meeting of the Dumfries and Galloway Division, N.V.M.A., at Lockerbie (Lockerbie House Hotel), 2.15 p.m.

Oct. 31st.—Meeting of the Lancashire Division, N.V.M.A., at Liverpool. (*See Notice.*)

Oct. 31st.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 2.30 p.m.

Oct. 31st.—Meeting of the Biochemical Society, at St. Thomas's Hospital Medical School, 2.15 p.m.

Nov. 15th.—Annual Meeting of the Society of Women Veterinary Surgeons, at Church House, Westminster, S.W.1, 11.30 a.m.

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N.V.M.A. Congress at Southport, 1948

The first meeting of the Provisional Committee to arrange the programme of the N.V.M.A. Congress to be held at Southport next year was held at the Veterinary School, Pembroke Gardens, Liverpool, on Friday, October 10th, 1947. Professor J. G. Wright, F.R.C.V.S., of the University of Liverpool Veterinary School, was appointed Chairman of the Provisional Committee and Mr. H. R. Hewetson, M.R.C.V.S., of Southport, Hon. Local Secretary.

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"The Veterinary Record"

The Editorial Committee has appointed a Sub-committee with the following terms of reference: "To consider what steps, if any, may now be taken to improve *The Veterinary Record* as a scientific journal and as the organ of the profession."

The Sub-committee would appreciate the receipt from readers of suggestions for the improvement of the Association's journal in any respect. They should be addressed to the Editor at 36, Gordon Square, London, W.C.1.

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Posts in the Department of Agriculture, Union of South Africa

We have been asked by Mr. W. D. Malherbe, Hon. Secretary of the South African Veterinary Medical Association, P.O./P.K., Onderstepoort, Pretoria, South Africa, to intimate to members, R.C.V.S., that, at the instance of the Council of the S.A.V.M.A., intending applicants for appointments in the Department of Agriculture of the Union are advised to communicate with him for further information before taking this step.

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PERSONAL

Birth.—Chalmers.—On September 6th, 1947, at Edinburgh, to Margaret, wife of A. W. Chalmers, Dean, Khartoum Veterinary School, a son—Robert Rowan.

MacKinnon.—On October 10th, 1947, at South Molton, to Brenda, wife of Malcolm M. MacKinnon, B.Sc., M.R.C.V.S., 6, New Road, South Molton, a son.

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Marriages.—Frost—Armstrong.—On October 11th, 1947, at the Parish Church, Messingham, Lincs., Hugh Frost, M.R.C.V.S., of Fairmile, Oathall Road, Haywards Heath, to Marguerite Armstrong, of Holly House, East Butterwick, Lincs. Mr. G. R. Bargh, B.Sc., M.R.C.V.S., was best man.

Thornton—Harler.—On October 18th, 1947, at Gloucester Street Congregational Church, Weymouth, Paul W. D. Thornton, M.R.C.V.S., younger son of Frank J. Thornton, M.R.C.V.S., and Mrs. Thornton of Dorchester, to Margery Doreen, second daughter of Mrs. F. C. Harler of Weymouth.

R.C.V.S. OBITUARY

Colebourn, Harry, D.V.M., Major, late C.A.V.C., Health of Animals Branch, Dominion Department of Agriculture, Winnipeg, Manitoba, Canada. Graduated D.V.M. (Toronto) 1911; M.R.C.V.S. December 11th, 1919. Died September 24th, 1947; aged 62 years.

Gibson, George Edward, "Burnholme," Wolverton Road, Newport Pagnell, Bucks. Graduated Glasgow, January 24th, 1885. Died October 6th, 1947; aged 88 years.

Young, Thomas Peter, 50, Pilrig Street, Leith, Midlothian. Graduated Edinburgh, July 20th, 1923. Died October 9th, 1947; aged 50 years.

Dr. Harry Colebourn

Dr. Harry Colebourn, D.V.M. (TOR.), M.R.C.V.S., whose death we record above with much regret, was born in Birmingham in 1885. He went to Canada in 1906 and the year after his graduation at Toronto he went to Winnipeg where he accepted a position with the Dominion Department of Agriculture.

Dr. Colebourn joined the Fort Garry Horse Regiment with which he went overseas in 1914 as a veterinary officer. He was twice mentioned in despatches. After serving with both Canadian and Imperial Forces he graduated at the Royal Veterinary College, London, in 1919.

He returned to Canada the following year, and remained with the Department of Agriculture until his retirement in 1945. He was a member of the Fort Garry Unit of the Army, Navy and Air Force Veterans' Association.

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Royal Veterinary College

Principal Buxton's Report at Opening of New Session

Prizes Presentation by the Duke of Gloucester

The official opening of the new session of the Royal Veterinary College, London, was honoured by the presence of H.R.H. the Duke of Gloucester, President of the College, who presented the prizes to the students successful in securing them during the past session, which Principal Buxton, in his report, stated to have been satisfactory in every respect.

Sir Archibald Weigall, President of the Royal Agricultural Society of England and Chairman of the Court of Governors of the R.V.C., welcomed the Duke who, although that was mainly a domestic occasion, had honoured them with his presence. It was the first occasion His Royal Highness had had the opportunity of coming there since His Majesty the King opened the College, and his presence was greatly appreciated.

He felt more and more that the Royal Family was taken very much for granted in Britain; Governments came and went and had to be endured in a democratic country (laughter) but the Royal Family stood as a solid rock upon which we in our trials and troubles could always lean. We had been very fortunate in this country in having a Royal Family that had set the greatest possible example in both their private and public lives, not only here but in the Dominions, which had helped to keep the constituent parts of the British Empire together during the past 100 years or more.

Continuing, Sir Archibald Weigall said he was perfectly sure his Royal Highness had all their hopes and aspirations very much at heart—this had shown very clearly throughout his life.

(Sir Archibald here read a letter from Mr. Tom Williams, Minister of Agriculture and Fisheries, expressing regret at being unable to attend owing to an important Cabinet meeting.)

The Principal's Report

Professor J. B. Buxton, having spoken of the success which had attended the past session, stated, in the course of his report, that of the 487 students of the College who presented themselves for examination during the year, 362, or 75 per cent., passed. During the year the Diploma of Membership of the Royal College of Veterinary Surgeons was awarded to 55 students of the College. The total number of graduates of the five colleges was 187, of which the R.V.C. had provided about 32 per cent. There were at present 455 students enrolled in all years of the College. This unusual number was due in large measure to the readmission of students who left them for a time to serve in the armed Forces and whom they felt bound to reinstate immediately they were demobilized. He thought it would be agreed that with such a record of academic achievement there was some justification for satisfaction. At the same time he felt that they should not be unduly complacent, for there was always room for improvement in some places.

Research was being actively pursued in all departments of the College, in many instances in collaboration with research workers in schools of the university and with outside bodies. One of the

primary duties of teaching institutions was to provide facilities for research of a fundamental character rather than for *ad hoc* research. The latter, the more spectacular of the two, was provided for on a relatively satisfactory scale. It was much more difficult to carry out fundamental research which, after all, was essential in providing a foundation upon which *ad hoc* research might be elaborated, and this type of research could only be pursued in institutions such as the Royal Veterinary College.

In the Beaumont Animals' Hospital the poor patients' clinic attendances numbered 7,500 for the first half of the year and it was likely that they would be very close to the 16,000 odd attained last year. This was an important part of the work of the College, since it not only provided very valuable material for teaching purposes, but alleviated much suffering amongst the animals of persons who could not ordinarily afford to pay for the excellent services which the hospital provided.

The Principal continued: "It is exactly ten years since these buildings, the resurrected R.V.C., were opened by His Majesty King George VI, accompanied by Her Majesty the Queen, and perhaps I may be permitted to glance back for a moment over this decade which, in fact, historians will regard as an epoch in the life of this College. Ample provision was made for the teaching of all subjects in the veterinary curriculum except the most important, the clinical subjects for the final examination for the Diploma of Membership of the Royal College of Veterinary Surgeons. Plans had been prepared and estimates obtained for the erection of buildings on the adjacent site for that purpose when in 1938 the Interdepartmental Committee on Veterinary Education issued their report. Naturally, many of the recommendations of the Committee led to prolonged discussions regarding the lay-out of veterinary teaching and before these had been completed the war was upon us. The very wise decision of the Governors taken in 1938 to remove the College to a less vulnerable area in the event of war, which was implemented when the catastrophe occurred in 1939, enabled us to put into practice several of the suggestions which had been made by the Committee, especially those relating to veterinary hygiene and animal husbandry, clinical teaching on the farm and the hospitalization of farm animals for practical demonstrations. It cannot be denied that these developments, pitifully small as they appear to us at the moment in the light of our present ideas, have broadened our teaching programme in many important directions which we should not wish to curtail under any circumstances. We hope that in the not too far distant future it may be possible to provide the necessary buildings at our new Field Station at West Grinstead and so enable us to develop the excellent facilities which that estate will provide for the teaching of animal husbandry, veterinary hygiene and the clinical subjects in relation to farm animals. It is this hope which is sustaining us in face of the difficulties with which we are at present contending in our endeavour to carry out the training of our students, so that they may fulfil all that can reasonably be expected of a new professional graduate."

Professor Buxton then referred to the special pleasure it gave him to be able to announce that several important scholarships had been secured by students and past students of the College, as follows:—

Mr. E. W. Jones, M.R.C.V.S., until recently Assistant in the Department of Surgery, had been awarded the Miss Aleen Cust Research Scholarship by the Royal College of Veterinary Surgeons of £300 p.a. for two years to study for a Ph.D. degree in Surgery at Cornell University and Mr. B. A. Cross, M.R.C.V.S., Mr. S. V. Boyden, M.R.C.V.S., Mr. C. le Q. Darcel, M.R.C.V.S., and Mr. Peter Kiddle, M.R.C.V.S., had been awarded Scholarships by the Veterinary Educational Trust for post-graduate study at Cambridge University.

Mr. W. G. Allen, final year student, had been awarded the Walley Memorial Prize of the Royal College of Veterinary Surgeons for the highest number of marks in the professional examinations in pathology, pharmacology and hygiene at all of the colleges, also the Tompson Scholarship of £136 for the highest aggregate of marks in the professional and class examinations of the second, third and fourth sessions of the curriculum; as well as the Evans Final Year Studentship of £50, awarded through the Veterinary Educational Trust to the student considered by the Governors to be the best student of the fourth year. The award is one of merit and previous records are taken into consideration.

H.R.H. the Duke of Gloucester, in presenting the awards, said that he could assure them that he was very glad to have an opportunity of revisiting the College that day, because what with the war and his absence in Australia as Governor General, it was ten years since he was there. He was there to present prizes and not to make a speech, but he would like to say how pleased he was to hear that all was going well with the College, and that the past year had been such a good one.

The progress made showed that there was little fault to find with the standard of teaching at the College, and it was reassuring to know that the College provided one-third of the total number of veterinary surgeons. The number of scholarships awarded for post-graduate training was certainly a matter for congratulation.

He also desired heartily to congratulate the prize winners and wish them all success in their future years. He hoped that the College would continue to prosper. (Loud applause.)

List of Prize Winners, July, 1947

Final Year

Gray, J. E., Royal Agricultural Society of England, Silver Medal; Coleman, First, Cecil Aldin, First; Clinical, Second. Darcel, C. le Q., Royal Agricultural Society of England, Bronze Medal; Coleman, Second; Cecil Aldin, Second. Frappell, J. P., Centenary, First; Surgery, First. Robertson, J. S., Clinical, First. Delfosse, Miss M. L., Medicine, First. Barnett, D. N., Medicine, Second. Startup, Mrs. C. M., Surgery, Second.

Fourth Year

Allen, W. G., Centenary, First; Parasitology, First. Barber, H., Clinical, First. Pugh, P. D. S., Clinical, Second; Pathology, First. Coward, T. G., Pathology, Second; Parasitology, Second.

Third Year

Betts, A. O., Centenary, First; Hygiene, First. Walker, R. G., Anatomy, First; Pharmacology, First. Ayre-Smith, R. A., Anatomy, Second. Smith, J. E., Hygiene, Second. Stockwell, Miss V., Pharmacology, Second.

Second Year

Jackson, B. N., Clinical, First. Withers, J. O., Clinical, Second. Restall, V., Anatomy, First. Corder, J., Anatomy, Second. Mercer, P. H., Physiology, First. Goodwin, R. F. W., Physiology, Second. Paine, G. D., Histology, First. Hide, D., Histology, Second. Threlkeld, J. M., Animal Management, First. Smalley, P. R., Animal Management, Second.

First Year

Howell, D. G., Centenary, First. Bradlaw, Miss R. E., Clinical, First. Crooks, J. L., Clinical, Second. Holton, J. A., Chemistry, First. Sainsbury, D. W. B., Chemistry, Second. Rees, W. H. G., Biology, First. Holcombe, R. B., Biology, Second.

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CONTROL OF PROPRIETARY MEDICINE ADVERTISING

"There is abundant evidence that the movement in Great Britain to reach a healthier and more realistic tone in proprietary medicine advertising is not an isolated attempt in a world which is otherwise inured to extravagant and misleading claims," observes the *Pharmaceutical Journal* in its issue of August 30th, and continues: "Several countries, especially the Dominions and the South American Republics, are seeking guidance on the subject and are making adjustments to their own regulations so as to close the gap between the situation which existed when therapeutics had only an empirical basis and present-day views on specific remedies for specific complaints. The United States of America is in almost a unique position, for under their Federal Food, Drug, and Cosmetic Act a far more rigid control over advertising can effectively be maintained than probably in any other country in the world. Recognition of this situation is made by the American Medical Association, and in their annual publication, 'New and Non-official Remedies,' the 1947 edition of which has just been issued, notice is taken of the requirement under the Act that the labels of medicines sold to the public must contain details of composition, and, applying the principle to prescribed medicines, 'N.N.R.' declares: 'Intelligent prescribing requires that the physician has access to full information as to the composition of what he prescribes.' The Act does not, however, rule out all direct advertising of medicines to the public, and the A.M.A. therefore point out that:—

'Indiscriminate self-medication by the public involves grave dangers, such as misdirected and inadequate treatment, failure to recognize serious disease until it is too late for effective treatment, and the spread of infectious diseases when hidden from a responsible physician. All these are involved in the advertising of drugs to the public, with the further dangers of suggesting by prescription of symptoms to the minds of the people that they are suffering from diseases described, the dangers of the unconscious and innocent formation of a drug habit and the dangers of starting allergic reactions.'

"It is nevertheless recognized that 'these dangers do not apply in equal degree to all articles, and there are instances in which more good than harm is likely to result from advertisements conveying truthful information to the public, if they do not mislead by undue emphasis or suggestion.' In consequence, consumer advertising in a certain limited field, in which disinfectants and laxatives are examples, will not preclude the admission of the products to 'New and Non-official Remedies,' but it is laid down that each group must carry adequate and acceptable labelling statements, such as 'for the relief of minor aches and pains' for analgesics, and 'for the treatment of occasional constipation' for laxatives. This is taking a practical view of the situation, and provided the safeguards are effectively enforced, the hall-mark of acceptance for 'N.N.R.' need not be withheld from the relatively few classes of 'household remedies' which can be used at the discretion of the public. When the time comes for proprietary medicines advertising to be tackled vigorously in Great Britain it may well be found that the easiest and most effective course to take will be to prohibit claims to be made outside a defined and limited selection of ailments."

ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreaks.

SHEEP SCAB:

Montgomery.—Rhydcul Farm, Llaurhaiadr ym Mochnant, Montgomeryshire (Oct. 14th).

Westmorland.—Hartrigg, Kentmere, Kendal, Westmorland (Oct. 13th); Winter Crag, Martindale, Penrith, Cumberland (October 17th).

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LEGAL NOTES

Bull Terrier's Behaviour.—An unusual case occupied Judge Armstrong for over three hours at Salisbury County Court on October 3rd, when (says the *Salisbury Times*) the plaintiff, Alfred Edward Carpenter, of Clifton Road, Parkstone, who bought a bull terrier from the defendants, Mesdames Mankin and Bloomfield, of The Warren, Alderbury, for 21 guineas, claimed the return of that amount on the ground that the dog did not comply with the implied warranty.

Plaintiff said he bought the dog on January 24th last. It was delivered to him by the kennelmaid, and for the first three days he was satisfied with him to the extent that he wrote to Mrs. Mankin saying he liked "Bill" very much, and with firm handling he would be ideal. After he had written the letter "Bill" fought with his terrier, and later bit his hand. Consequently he had to shut him up in the kennel. He bought the dog for stud purposes, but as it turned savage it was useless for that purpose, and although he had trained bears, monkeys and other wild animals he could do nothing with "Bill." The weather at that time was very severe, and he could not take the animal back, nor could defendants fetch him. After a telephone conversation with Mrs. Mankin he called in a veterinary surgeon and "Bill" was destroyed.

Plaintiff agreed with Mr. P. E. G. Mather, for defendants, that he did not want a "pansy" dog.

His Honour: If you bought a bull terrier you certainly did not expect to get one!

Mr. Henry G. Luckham, of Queen's Park, South Drive, Bournemouth, veterinary surgeon, said that when plaintiff bought the dog he gave it a clean bill of health. It had no ferocious tendencies, but when on February 1st he was called in to destroy it there was a nasty look in its eyes.

Defendant denied that "Bill" was anything but friendly when she sold it to plaintiff for stud purposes. The case would never have come up had it not been that she was ill, and because of the state of the roads it was impossible to travel, for she would have had him back. Other people wanted to buy "Bill."

Evidence as to the dog's friendliness was also given by a kennelmaid.

For the defence, Mr. Mather submitted that "Bill" had not been properly handled by plaintiff.

His Honour gave judgment for defendants with costs.

* * * * *

The Minister of Food has appointed Mr. Norman C. Wright, M.A., D.SC. (Christ Church, Oxford), PH.D. (Gonville and Caius College, Cambridge) to be his chief scientific adviser in succession to Sir Jack Drummond, D.SC., F.R.S. During the period of his appointment Dr. Wright will, with the concurrence of the Secretary of State for Scotland, be seconded from the Hannah Dairy Research Institute, of which he is Director.

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Erratum.—The following sentence appeared in an annotation on Newcastle Disease (September 6th, 1947): "Doyle found pigeons of all ages insusceptible to Newcastle Disease virus, but some workers have found old birds less susceptible." This is obviously incorrect—it was, in fact, a printer's error—and should have read: "Doyle found pigeons of all ages susceptible to Newcastle Disease virus, but some workers have found old birds less susceptible."

* * * * *

WEEKLY WISDOM

I present you, dear reader, a new method of discovering diseases of the chest invented by me. It consists of knocking at the human thorax. From the variation in reverberating sounds a judgment may be reached as to the condition of the contents of the chest cavity. Neither a craving for authorship nor an outburst of speculation, but seven years of observation is my reason for classifying, putting in order and publishing what I have thus discovered.—AUENBRUGGER (1761.) Quoted by L. F. Frick: "Development of our Knowledge of Tuberculosis" (p. 173).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents should write as briefly as possible and letters should not exceed 350 words.

BLOOD TRANSFUSION IN ANIMALS

Sir,—I was interested in Mr. F. G. Greer's letter in your issue of August 30th, 1947, and assume that the word "not" in line four is a misprint for "now." [The misprint is regretted.—*Editor.*]

In my experience untoward effects may follow blood transfusion in the horse, if the donor's blood is not fully compatible with that of the recipient. In collaboration with my medical colleague, Dr. E. Gaynor Lewis, I have carried out transfusions with citrated blood, administered by the drip method, in horses with a low red cell count and a low haemoglobin index brought about by bleeding them for antitoxin production. Twenty litres of blood are removed, in two bleedings of ten litres each, in three days. After transfusion an immediate rise in the haemoglobin index was obtained in all cases, but was not maintained for more than two days, when the bloods did not cross-match. In those instances where the donor's cells were agglutinated, *in vitro*, by the recipient's serum, it was not possible to transfuse, even by the very slow drip method, more than one or two litres without symptoms of distress—rigors and sweating—appearing. In two cases, where cross-matching indicated compatibility, an immediate rise in haemoglobin took place, when five litres of blood were transfused; this was maintained for two days, then fell to the pre-transfusion level in a further two days, and finally rose slowly to normal. This would indicate that the donor's cells were not fully compatible, because, although not immediately destroyed, they were eliminated in two days and, therefore, had no lasting beneficial effect.

In one small experiment, the bloods of 30 horses were cross-matched, without a so-called universal donor being found. The "best" cells were agglutinated by two sera and the "worst" by 21 sera. It is not always an easy matter to assay agglutination of horse erythrocytes and often, even under the microscope, it is difficult to distinguish tiny clumps from rouleaux.

My veterinary colleague, Dr. M. H. V. Brown of Johannesburg, permits me to say that he has carried out some hundreds of transfusions, without prior compatibility tests, in dogs suffering from anaemia, a sequel to biliary fever. In many instances, the results were spectacular, but occasionally no benefit whatever followed, possibly due to the use of incompatible cells.

Yours faithfully,

J. H. MASON.

Serum Department,
S.A.I.M.R.,
Johannesburg.
September 30th, 1947.

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A CANCELLED VISIT FROM ALFORT

Sir,—We, of the Royal Veterinary College Rugger Club, would be pleased if you would kindly publish in your journal our appreciation of those veterinarians and others who so willingly wished to help us to enlighten the Alfort (France) veterinary students about English veterinary methods and establishments, and to make their visit a social success. We were most disappointed when they informed us, at so late a date, that they were unable to make the trip, and to fulfil the rugger fixture of October 25th in London.

Our thanks must especially go to Messrs. May & Baker (Dagenham) who arranged at considerable trouble to themselves, a programme which I feel sure would have been of great interest and which included a tour of their factory and a "Welcoming" lunch. To those of the Agricultural Research Station at Compton and the Zoological Gardens we convey our thanks, and we respectfully hope that we may have the privilege of taking the Alfort students to these places when they visit us to play the "return" fixture.

To the staff of our College we are in no small way indebted for their co-operation and assistance at all times, and we wish to show our appreciation.

Yours faithfully,

H. W. BISHOP,
Hon. Secretary.

Royal Veterinary College Rugger Club.
October 17th, 1947.